

WHAT IS CLAIMED IS:

1. A method for controlling the idle speed of an engine within a hybrid electric vehicle including a generator having a rotor assembly which is operatively coupled to an engine, said method comprising the steps of:

determining whether a first set of vehicle idle entry conditions are met, wherein said first set of vehicle idle entry conditions comprises whether the vehicle is below a predetermined maximum idle speed and whether an accelerator pedal is below a predetermined minimum pedal position;

scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present;

selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present; and

turning off the engine when said first set of conditions is not present and when the engine has

been in a current vehicle idle mode for a predetermined amount of time.

2. The method of claim 1, wherein the step of scheduling a desired engine brake torque and
5 selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine
10 brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when a state of charge of a battery is below a predetermined battery minimum state of
15 charge.

3. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle

system controller to control said generator to schedule a desired engine speed to produce a first desired effect when a vacuum level in a climate control reservoir is below a predetermined minimum 5 climate control vacuum level.

4. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine 10 speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to 15 schedule a desired engine speed to produce a first desired effect when a vacuum level in a brake system reservoir is below a predetermined brake system vacuum level.

5. The method of claim 1, wherein the 20 step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a

first set of operating conditions is present comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to 5 schedule a desired engine speed to produce a first desired effect when a vacuum level in a powertrain vacuum mount reservoir is below a predetermined minimum powertrain mount vacuum level.

6. The method of claim 1, wherein the
10 step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present
15 comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when a vapor canister contained within
20 a fuel system requires purging.

7. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to

control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine
5 brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when an adaptive fuel table requires HEV-fast adaptive learning.

10 8. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present comprises the step of scheduling a desired engine
15 brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when the engine has cooled below a predetermined engine temperature.
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9. The method of claim 1, wherein the step of scheduling a desired engine brake torque and

selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present

5 comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed to produce a first desired effect when a catalyst has cooled below a

10 predetermined minimum catalyst temperature.

10. The method of claim 1, wherein the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and producing a first desired effect when a first set of operating conditions is present

15 comprises the step of scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to

schedule a desired engine speed to produce a first desired effect when air conditioning has been requested by a vehicle operator.

11. The method of claim 1, wherein the step of selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present comprises the step of

5 selectively activating an engine controller to control engine idle speed when:

the generator has failed; or

a battery state of charge exceeds a maximum desired level.

10 12. A hybrid electric vehicle including a
generator having a rotor assembly which is
operatively coupled to an engine, the hybrid electric
vehicle comprising:

a vehicle system controller for controlling
15 the idle speed of the engine when a first set of
operating conditions is present at a scheduled engine
brake torque to produce a desired result; and

an engine controller for controlling the idle speed of the engine when a second set of operating conditions is present.

13. The method according to claim 11,
wherein said first set of operating conditions is
selected from a group consisting of a low battery

state of charge, a low climate control vacuum level,
a low brake system reservoir vacuum level, a low
powertrain mount vacuum level, a high fuel tank vapor
pressure requiring fuel vapor canister purging, a
5 condition where the fuel vapor canister is currently
being purged, a minimum time reached since previously
purging the vapor canister, a low engine temperature,
a low catalyst temperature, an adaptive fuel table
requiring HEV-fast adaptive learning, and an
10 activated air conditioning switch.

14. The hybrid electric vehicle of claim
12, wherein said second set of operating conditions
is selected from a group consisting of a high battery
state of charge and a failed generator.

15 15. A method for controlling the idle
speed of an engine within a hybrid electric vehicle
including a generator having a rotor assembly which
is operatively coupled to an engine, said method
comprising the steps of:

20 determining whether a first set of vehicle
idle entry conditions are met, wherein said first set
of vehicle idle entry conditions comprises whether
the vehicle is below a predetermined maximum idle

speed and whether an accelerator pedal is below a predetermined minimum pedal position;

scheduling a desired engine brake torque and selectively activating a vehicle system controller to control said generator to schedule a desired engine speed and produce a first desired effect when a first set of operating conditions is present, wherein said first set of operating conditions is selected from the group consisting of a low battery state of charge, a low climate control vacuum level, a low brake system reservoir vacuum level, a low powertrain mount vacuum level, a high fuel tank pressure, the existence of a minimum time period since a last vapor canister purging, the existence of current vapor canister purging, the existence of a learned adaptive fuel table for the current driving mode, a low engine temperature, a low catalyst temperature, and the state of activation of an air conditioning switch;

20 selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present;

turning off the engine when said first set of conditions is not present and when the engine has

been in a current vehicle idle mode for a predetermined amount of time, otherwise maintaining said current vehicle idle mode.

16. The method of claim 15, wherein the
5 step of selectively activating an engine controller to control engine idle speed when a second set of operating conditions is present comprises the step of selectively activating an engine controller to control engine idle speed when:

10 the generator has failed; or
 a battery state of charge exceeds a maximum desired level.

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